

*Diversion Is Good for the
Economy: Highlights from Two
Independent Studies on the
Economic Impacts of Diversion
in California*

March 2003

S T A T E O F C A L I F O R N I A

Gray Davis
Governor

Winston H. Hickox
Secretary, California Environmental Protection Agency

•

INTEGRATED WASTE MANAGEMENT BOARD

Linda Moulton-Patterson
Board Chair

José Medina
Board Vice Chair

Steven R. Jones
Board Member

Michael Paparian
Board Member

Cheryl Peace
Board Member

Carl Washington
Board Member

•

Mark Leary
Executive Director

For additional copies of this publication, contact:

Integrated Waste Management Board
Public Affairs Office, Publications Clearinghouse (MS-6)
1001 I Street
P.O. Box 4025
Sacramento, CA 95812-4025
www.ciwmb.ca.gov/Publications/
1-800-CA-WASTE (California only) or (916) 341-6306

Publication #570-03-002



Printed on recycled paper containing a minimum of 30 percent postconsumer content.

Copyright © 2003 by the California Integrated Waste Management Board. All rights reserved. This publication, or parts thereof, may not be reproduced in any form without permission.

The State makes no warranty, expressed or implied, and assumes no liability for the information contained in the succeeding text. Any mention of commercial products or processes shall not be construed as an endorsement of such products or processes.

The California Integrated Waste Management Board (CIWMB) does not discriminate on the basis of disability in access to its programs. CIWMB publications are available in accessible formats upon request by calling the Public Affairs Office at (916) 341-6300. Persons with hearing impairments can reach the CIWMB through the California Relay Service, 1-800-735-2929.

The energy challenge facing California is real.

Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, **Flex Your Power** and visit

www.consumerenergycenter.org/flex/index.html.

Table of Contents

Introduction.....	2
Goals of the Studies	3
Different Assumptions Shape the Studies.....	4
Origin of Materials Diverted	4
Activities Included as Diversion	4
Materials Included as Diversion	4
Years Covered by Studies	4
Do Different Tonnages Mean Different Rates?	5
Methods of the Studies.....	5
Data Collection.....	5
Economic Analysis Software	5
Types of Impacts	6
Output Indicators.....	6
Results of the Individual Studies	6
UCB Study	6
REI Study	8
Similar Findings in Studies.....	12
Summary	12

Introduction

The environmental costs associated with burying or burning garbage (solid waste) should be enough incentive to motivate people to compost, reduce, reuse, recycle, and buy recycled. However, if the environmental costs aren't enough motivation, two independent, pioneering studies suggest that choosing disposal over diversion also has significant economic costs. It turns out that how we handle our garbage can impact our wallets.

While you may not see your garbage as a resource, the materials it contains can be remanufactured into new, valuable recycled-content products. When a truck takes your solid waste away, it doesn't disappear. However, burying solid waste in a landfill does make something disappear . . . the additional jobs, sales, and other economic activity that could be generated when those materials stay in circulation.

Some money will be spent whether we dispose or divert the next ton of waste generated in California. How that money circulates and cycles through our economy determines the economic growth gained (measured in sales, jobs, and income). The process of collecting, transporting, and safely disposing of our solid waste also creates jobs and economic activity. Garbage trucks rumbling down our streets, the ever-present cans and dumpsters, and our monthly solid waste bills are reminders of the economics of waste disposal.

Even though California has made considerable investments in the infrastructure to support composting and recycling, not as many obvious reminders exist for the economics of diversion activities. Diversion activities are usually more decentralized and occur at smaller, less conspicuous locations than solid waste landfills. While solid waste collection and disposal are usually government-sanctioned, -funded and/or -operated, many diversion activities are dependent on the actions of individuals and/or small businesses. For all these reasons, it is much harder to identify and calculate the economic benefits from diversion.

Until recently, very little work had been done on economic impact analyses related to solid waste disposal or diversion. To further our understanding of the impact of solid waste on the economy and to encourage the development of this emerging field of study, the California Integrated Waste Management Board (CIWMB) sponsored two independent economic studies.

George Goldman and Aya Ogishi, researchers at the University of California, Berkeley (UCB) conducted their study titled *The Economic Impact of Waste Disposal and Diversion in California*.

Tim Buwalda at R.W. Beck Inc., worked with the National Recycling Coalition to complete *The California Recycling Economic Information Study* (REI).

The CIWMB's investment (\$55,000 for the UCB Study and \$78,000 for the REI Study) allowed the researchers to gather and evaluate an entirely new set of data, explore new methods, and start to build new economic models for solid waste disposal and diversion.

Each study is unique, contains a wealth of information, and can be examined individually since they are included as appendices to this brief synopsis. The studies addressed different questions and pursued different goals. The definitions of waste types and data sources varied somewhat, but both used IMPLAN (an input/output economic model) for analysis. While neither independent study was designed to complement, refute, or relate to the other, in the end they had some similar findings and reached some very similar conclusions.

The results from these studies showed that while solid waste disposal may be more centralized, making the economic benefits more obvious, reuse and recycling activities actually create more sales, income, and jobs in California. The studies show that diversion:

- Is a big business, comparable with other large industries in California.
- Is a bigger benefit per ton to the economy than disposal.
- Is already comparable to disposal in its total impact on the statewide economy.

The studies concluded that diversion is good for the economy. This suggests that California's economy will benefit as the state progresses toward its goal of zero waste. Both studies also stressed the importance of developing and supporting markets for recycled materials, so that materials can cycle through the manufacturing process (and economy) multiple times rather than making a relatively short one-way trip through the economy to a landfill.

Goals of the Studies

The main goal of each study has been paraphrased and shortened for readability.

UCB Study Goal: To estimate and compare the economic impacts of the waste disposal and diversion systems statewide and regionally.

REI Study Goal: To document the size and economic impact of the recycling and reuse industry in California as compared to other industries and other states.

Each study attempted to gain perspective and convey information through industry and geographic comparisons:

- The UCB study compared the economic impacts from diversion only with those from the disposal industry by first developing a statewide material flow model including both disposal (landfills and waste-to-energy facilities) and diversion, and then quantifying the economic impacts from both.
- The REI study focused on documenting the size and makeup of only the recycling/reuse industry, comparing the economic impacts from diversion with those from several other major industries within California.
- The UCB study looked at the relative economic impacts of diversion in six different economic sub-regions in California and showed how they aggregate to impact the statewide economy.
- The REI study, as part of the larger nationwide study, ranked California alongside other states and showed how the economic impacts from diversion in California fits within the nationwide economy.

The central goals of each study appear to be fairly similar with regards to diversion; however, the details reveal very different assumptions and approaches that led to differences in the data and methodologies used.

Different Assumptions Shape the Studies

The biggest difference between the assumptions and data used by the two studies was in determining the number of tons diverted in California. Using a more inclusive list of diverted materials and activities, the REI study estimated that approximately 40 million tons of materials from inside and outside of California are handled, recycled, or composted annually within the state. Limiting the universe to materials generated within California and to those materials and activities consistent with the state's 50 percent diversion mandate, the UCB study estimated that 18 million tons of material were recycled or composted in the state. In addition to the challenges always associated with researching new areas, four issues contributed to this tonnage difference between the two studies.

Origin of Materials Diverted

While both studies set California as the key geographic target area, they differ in several significant ways. The UCB study was commissioned to measure the impact that the Integrated Waste Management Act has had on California's economy, so the scope was limited to waste generated within California. The REI study was commissioned to document the entire recycling and reuse infrastructure within California. The UCB study includes only economic impacts derived from the diversion of materials originating within California, while the REI study includes all economic impacts derived from the diversion of materials regardless of their state/nation of origin.

California's industries manufacture many products using feedstock from outside the state. Recycled feedstock imported into California for remanufacturing was included in the REI study but excluded from the UCB study. With several major ports, California also serves as a conduit for many materials, feedstocks, and products moving to and from other states and nations. Economic impacts (for example, intermediate processing, transportation, material brokers, etc.) associated with these materials while in California were included in the REI study but excluded in the UCB study.

Activities Included as Diversion

Both studies estimated the tonnage of materials recycled and composted. Neither study estimated the tonnage of materials source-reduced, reused, or eliminated through waste prevention. However, the REI study did estimate the economic impacts related to reuse. To be consistent with the State's definition of diversion, the UCB study only included recycling, composting, biomass conversion, and alternative daily cover (ADC) use at landfills. To be consistent with their larger nationwide study, the REI study included recycling, reuse, and composting, but it did not consider biomass conversion or ADC to be diversion.

Materials Included as Diversion

Statutory limitations also led the UCB study to exclude a portion of some diverted materials, including inert solids (for example, dirt, concrete, asphalt, etc.), scrap metals, agricultural wastes, and all diversion of used motor oil and tires. To quantify the economic impacts of the entire material-handling infrastructure, the REI study included the diversion of all these materials.

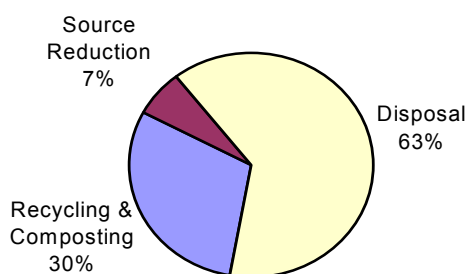
Years Covered by Studies

The UCB study used 1999 diversion amounts, while the REI study estimated and then used 2000 diversion tonnages. In California, diversion has increased annually and as expected, diversion was higher in the REI study.

Do Different Tonnages Mean Different Rates?

Neither study was designed for use in calculating a new statewide solid waste diversion rate. In fact, the UCB study relied on the current goal measurement system for many data inputs. While not consistent with the state's official diversion rate measurement system that reported a 37 percent diversion rate for 1999, the higher diversion amount reported in the REI study would yield a 54 percent statewide diversion rate. One could argue that this higher rate (Figure 1) more accurately reflects California's commitment to principles and investment in the infrastructure for diverting solid waste. These types of differences in methodologies could also help explain why many other states with less developed diversion infrastructure and programs post higher diversion rates than California.

1999 Diversion Rate of 37% Using UCB Study Estimate of Diversion



2000 Diversion Rate of 54% Using REI Study Estimate of Diversion

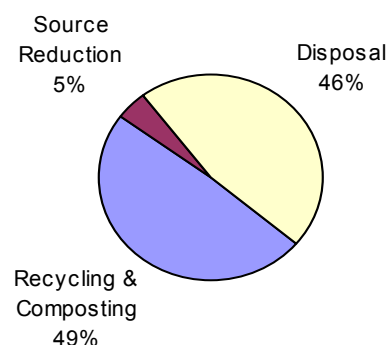


Figure 1. Alternative views of California's waste stream.

Methods of the Studies

While the basic goals and underlying assumptions in each study were quite different, the methods were similar in many ways.

Data Collection

Both studies relied on data primarily from secondary sources. The UCB study used CIWMB data sources whenever they were available, as well as data from the U.S. Department of Commerce, waste industry studies, and targeted industry surveys. The REI study primarily relied on data from the U.S. Department of Commerce, industry studies and experts, industry surveys, and other data derived from a variety of sources.

Economic Analysis Software

Both studies used IMPLAN, an input/output economic model, and analysis software.

Types of Impacts

Both studies examined:

- Direct impacts from establishments involved in the targeted activity (for example, collectors, processors, recyclers, and composting).
- Indirect impacts from supporting establishments (for example, transporters, equipment manufacturers, etc.).
- Induced impacts from these businesses and their employees on the economy (for example, employees purchasing unrelated goods and services).

Output Indicators

The studies yielded several common economic impact indicators: jobs, output, income, and value added. While the exact definitions are different in each study, the following simplified meanings can be more easily understood:

- Jobs = all paid positions (part or full-time, not full-time equivalents) in a given sector.
- Output = all gross sales plus all public outlays in a given sector.
- Sales = all sales and revenues in a given sector.
- Income = all wages, salaries, and benefits in a given sector.
- Value added = enhancement of the value of goods and services by a given sector.

Results of the Individual Studies

In this section, highlights from each study are presented individually, but some similarities and differences will be apparent.

UCB Study

Solid waste (disposal and diversion) is a significant segment of the economy.

Together, the disposal and diversion of solid waste generated in California is “big business” as shown by the following economic indicators for 1999:

- Direct total sales of \$9.2 billion.
- Output impact of \$21.2 billion.*
- Income impact of \$7.9 billion.*
- Value-added impact of \$10.7 billion.*
- Jobs added 179,000.*

*Direct, indirect, and induced impacts

Diversion resulting from California’s 50 percent diversion mandate has had significant impacts on the state’s economy:

- Output impact of \$10 billion.*

- Income impact of \$4 billion.*
- Value-added impact of \$5 billion.*
- Jobs added 85,000.*

*Direct, indirect, and induced impacts.

More tons are disposed but overall diversion has a similar economic impact.

In 1999, California generated approximately 56 million tons of solid waste, with 38 million tons disposed and 18 million tons diverted. As illustrated in Figure 2, the UCB study shows that the economic impacts from diverting waste are comparable to those from disposal of the residual solid waste.

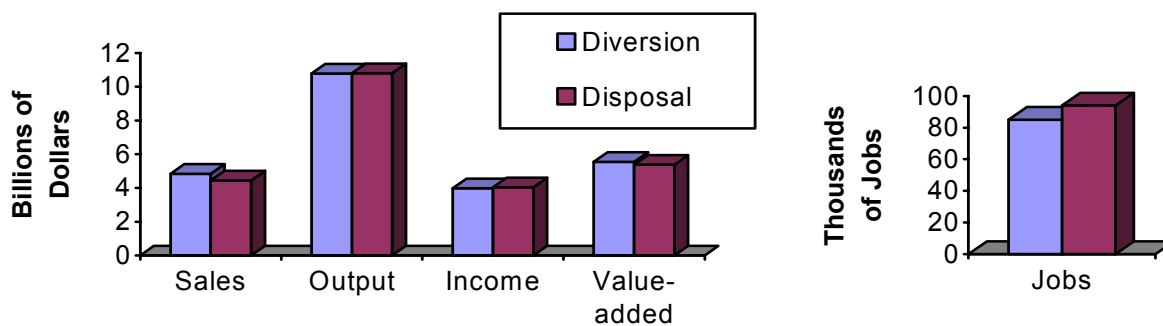


Figure 2. Economic impacts of disposal and diversion from California sources and in compliance with the State's Integrated Waste Management Act.

While the numbers were different, the conclusion was the same in the REI study: "Despite the fact that more discards are disposed than recycled, it is not surprising that the recycling and reuse industry is larger than the waste management industry. This is because recycling and reuse are inherently value-adding, whereas disposal is not, and value-adding processes support jobs and economic activity."

Diversion's economic impacts per ton of material are twice that of disposal.

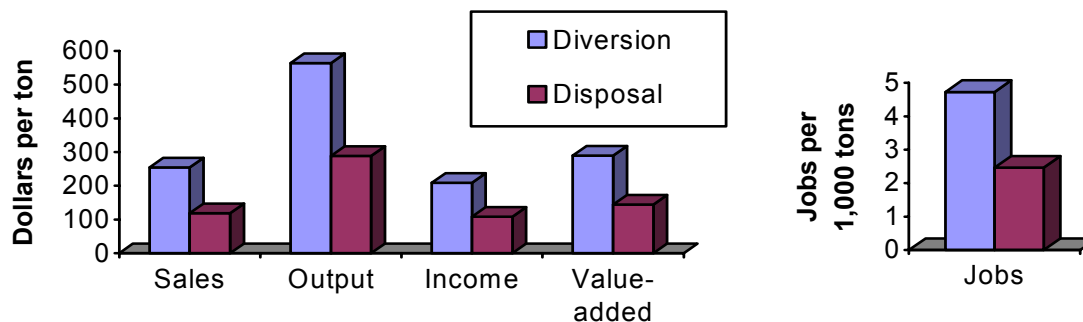


Figure 3. Economic impacts per ton of disposal and diversion.

Figure 3 shows the relative impact per ton from disposal and diversion. It clearly illustrates that keeping materials out of the landfill and circulating in the product stream benefits the economy. Diversion has doubled or nearly doubled the per-ton economic impact of disposal. The UCB study stressed the importance of developing and supporting markets for recycled materials as a key to further economic benefits from diversion.

Statewide economic benefits of diversion come primarily from three regions.

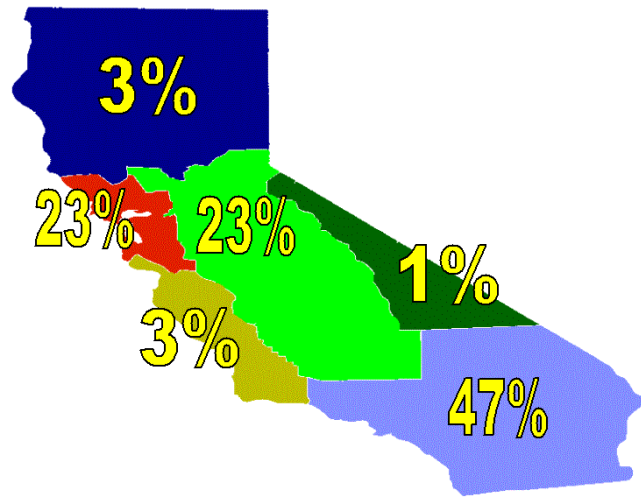


Figure 4. Percent of statewide diversion economic impact in six regions.

As might be expected, Figure 4 shows that the highest economic impacts from diversion occurred in those regions of the state with the most people, industry, and solid waste. The UCB study found that regions with less diversion infrastructure, less solid waste feedstock, and locations further from markets for recycled materials show much smaller relative impacts.

REI Study

Recycling and reuse is a significant segment of the economy.

The REI study quantified the recycling and reuse industry in California and found it to be a highly diverse industry that is well established and organized. The study found that California's recycling and reuse industry consists of:

- 5,300 establishments.
- 84,000 direct employees.
- \$2.2 billion annual payroll.
- \$14.2 billion annual revenues.

The REI study found that the recycling and reuse industry is a viable industry that adds jobs and strength to California's economy. The REI study strongly recommended that the recycling industry be supported with incentives and funding: "Investments at the local level in collection

and processing of recyclables and public policies that favor recycling and reuse certainly support large private sector investments in downstream processing and manufacturing.”

Within recycling, manufacturing is the biggest contributor to the economy.

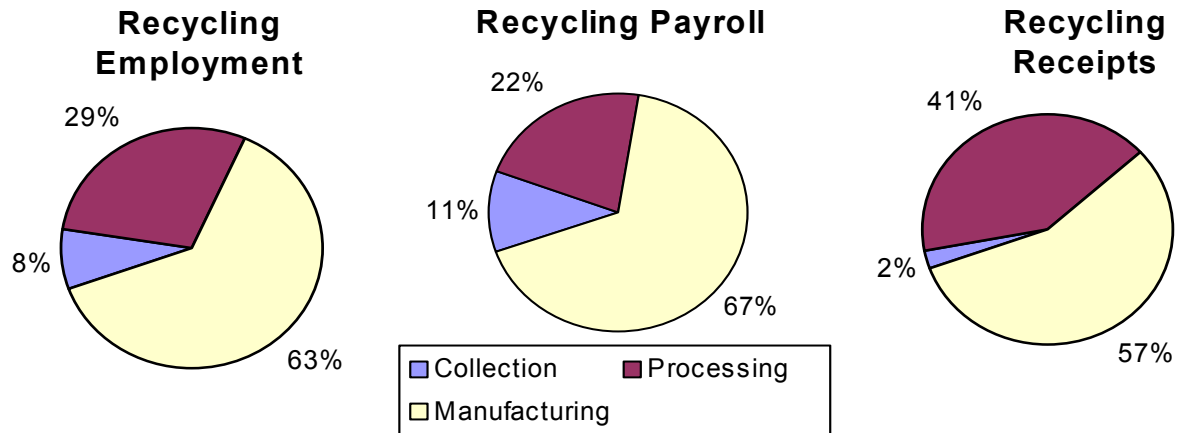


Figure 5. Economic indicators showing that recycling manufacturing is the dominant economic driver.

The economic benefits related to recycling far exceed those of reuse. Within recycling employment, payroll and revenue come primarily from recycling manufacturing, with collection and processing contributing far less. This again underlines the importance of building and supporting markets for recycled-content products. If materials are only collected and then processed but not turned into new products, then the majority of the economic benefit is lost. As shown in Figure 5, the recycling manufacturing sector is the downstream consumer of recovered materials and accounts for 63 percent of employment and 57 percent of receipts.

While the numbers were different, the UCB study supported this conclusion, “Creating markets to accept more recyclable and compostable materials would be the key to stimulating more economic activities and higher impacts in the state.”

Materials were identified as key contributors.

Within recycling manufacturing, the REI study also looked at differences between materials.

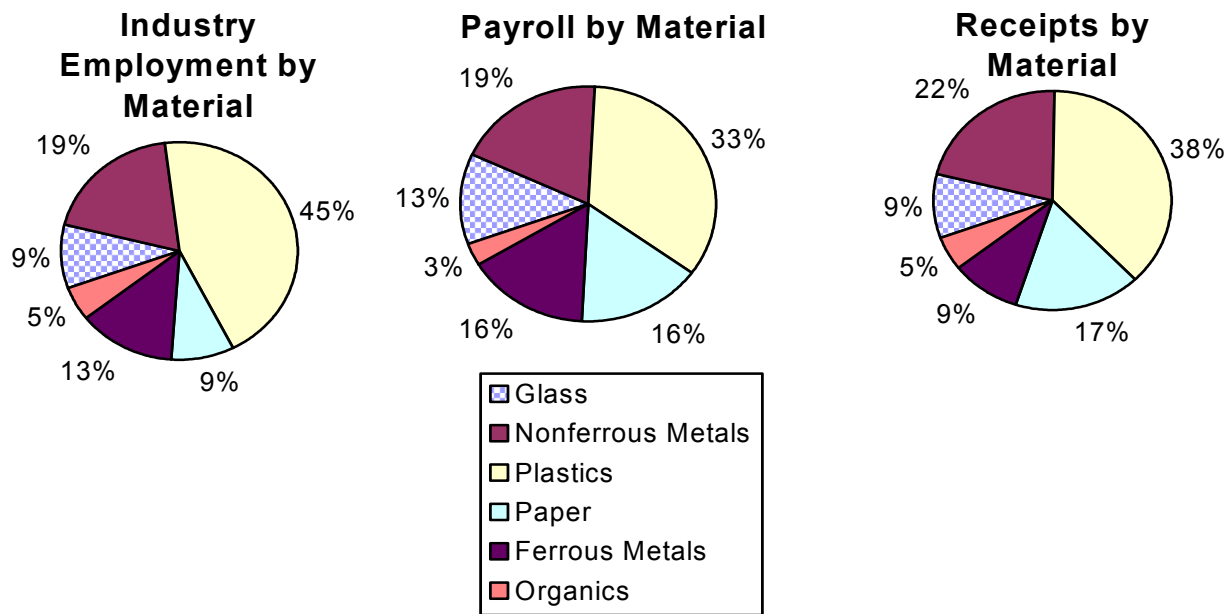


Figure 6. REI study economic impacts by material diverted.

The UCB study also looked at differences between materials.

The results are very different regarding the total size of the material impacts and the contributions of the various materials, particularly plastics. When plastics are removed from the analysis, the pie charts from the two studies are much more similar. The contributions related to plastics will be one of several issues to examine in future studies.

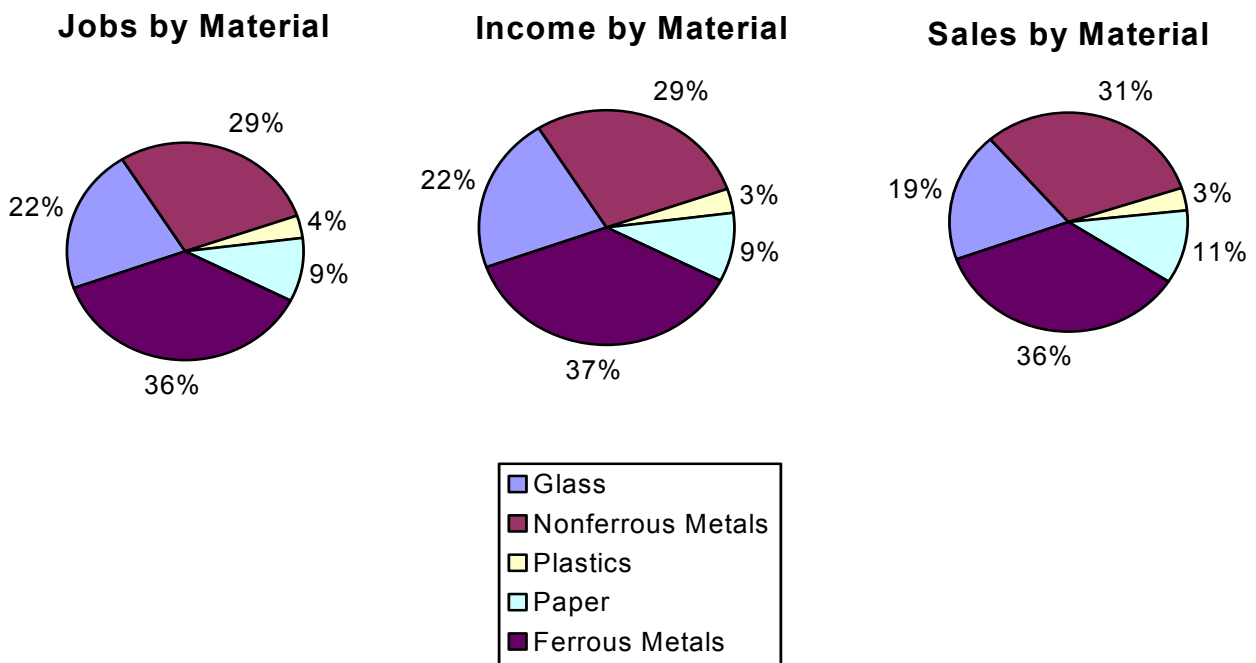


Figure 7. UCB study of economic impacts by material diverted.

The REI Study diversion is comparable to other major industries.

Within California, recycling and reuse activities make up a major industry. This provides direct employment comparable to the manufacturing of machinery and the motion picture/video industry.

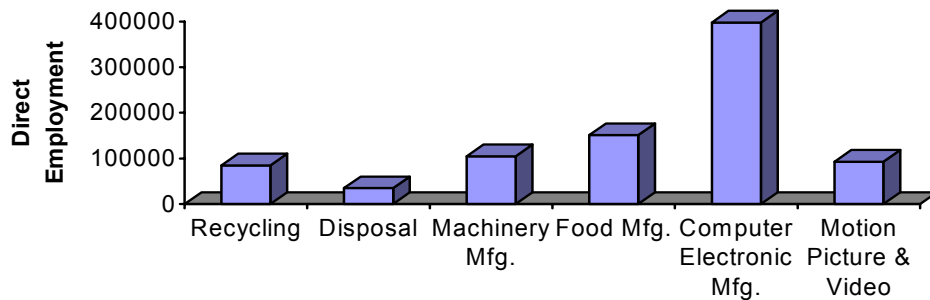


Figure 8. Economic sector comparison.

California is among the top states in employment in recycling and reuse.

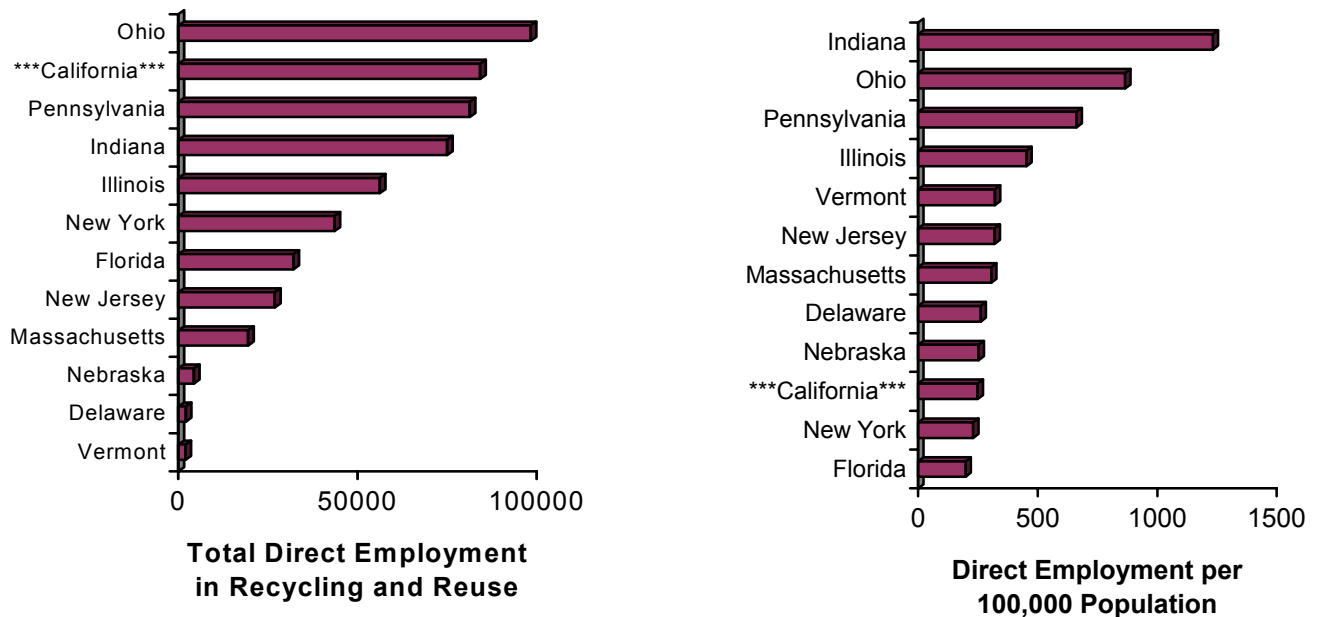


Figure 9. A comparison of recycling employment in California and other states.

A part of the larger national study to compared the impacts of recycling and reuse between states. According to this comparison, California has the second-highest direct employment in recycling and reuse. The other top states are heavily industrial, and a large part of their economic impacts are related to manufacturing using recycled feedstocks. California's per capita employment in this sector is lower. This could be a reflection of many things, including economies of scale found in larger states.

Similar Findings in Studies

Despite differences in their findings, both studies support the concept that solid waste diversion is a big business (for example, bigger than disposal, comparable with other large industries in California, etc.). The large and small businesses throughout California that reuse, collect, and process recycled feedstock—and those that manufacture products with recycled content—cycle billions of dollars through California’s economy every year. While the overall economic impacts are different due to the different definitions and universes studied, the per-ton economic impacts from diversion were surprisingly similar.

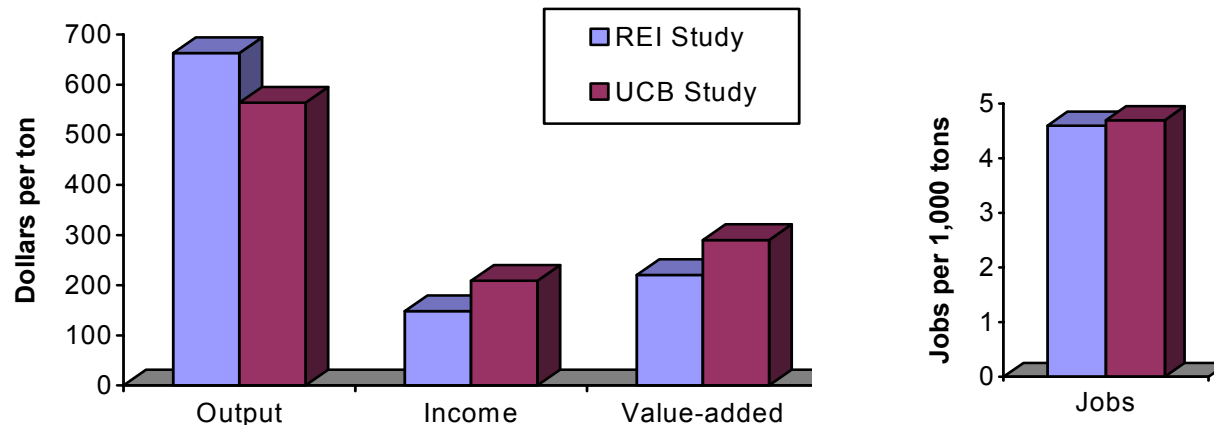


Figure 10. Similar economic impacts per ton of diversion are apparent in both studies.

Both studies concluded that building and supporting markets for recycled materials is the key to more economic growth from diversion. Although collecting and processing materials are important generators of jobs, they do not contribute as much to the economy as remanufacturing recycled feedstock into new products and using compost to grow the state’s crops. Recycling and reuse are important in preventing the waste of resources and the growth of landfills, but buying recycled is the key to sustained economic growth from diversion.

Summary

While future studies will surely refine the methods, improve the quality of the data on the size and composition of the waste stream, and provide a better understanding of the economics of disposal and diversion, these two groundbreaking studies have made large strides into a previously uncharted area. It is widely accepted that diversion is good for the environment, but both of these economic studies have now shown that diversion is good for the economy too.